Compass Operations Guide		
Policy	Section	Date
Yearly Maintenance & Equipment Scope	7001	1-19-2021

1. Critical Equipment Service Scope

(1) The Scope of Work for the Compass Datacenters (Compass) critical equipment are proposed as follows:

Compass Datacenters Preventative Maintenance Schedule												
Electrical Support Activities	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
UPS Systems		A						SA				
UPS Lithium-Ion (Maintenance Free Daily Rounds Checks	D	D	D	D	D	D	D	D	D	D	D	D
Generators	SA						A					
Fuel Cleaning					A							
Automatic Transfer Switches			Q			A			Q			Q
Switchgear – Square D Custom QED Switchboards							A					
Switchgear – Infrared Scanning							A					
Power Distribution Units							A					
Substations								A				
Mechanical Support Activities												
HVAC Systems – Data Center	Q			A			Q			Q		
HVAC Systems – Non-Data Center	Q			A			Q			Q		
Fire/Life Safety Support Activities												
Portable Fire Extinguishers	M	M	M	M	M	M	M	M	A	M	M	M
Water Based Systems (Pre-Action and Wet)									A			
Fire Detection and Suppression Systems			Q			Q			A			Q
Fire Detection and Alarm			Q			Q			A			Q
Data Center Floor Management												
Data Center Monitoring and Cleaning	A			Q			Q			Q		
***A** – Annually **SA** – Semi-annually **Q** -Quarterly **M** – Monthly **D** – Daily*												

2. Electrical Support Activities

(1) UPS Systems – 1000 1.2 MW APC GALAXY

2.1.1 Two (2) Preventative Maintenance (PM)s per year.

2.1.2 One (1) semi-annual (minor) and (1) annual (major).

2.1.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the UPS room is secure, and temperatures are within normal operating range.

2.1.4 Semi-Annual (Minor) PM

(1) All semi-annual checks will be on-line checks only.

(a) Ensure that the equipment is clean and free of dust, dirt and debris.

(b) Verify that the software is current – update if necessary.

(c) Check system operation and parameters through the computer software to verify proper system operation.

(d) Check and record all system alarms – correct, as necessary.

(e) Check and record input and output voltages, currents and power factors.

(f) Check and record DC voltages and currents.

(g) Check and record AC ripple voltages and currents on the DC bus.

(h) Provide a written report covering all findings and any corrections or upgrades completed.

2.1.5 Annual (Major) PM

(1) All steps performed in the semi-annual service plus.

(a) Isolate and de-energize UPS for maintenance testing.

(b) Test the main operating sequences.

(c) Clean interior and exterior components and enclosures.

(d) Inspect and clean all air intakes and exhausts. Verify proper airflow.

(e) Verify all electrical connections are tight and torqued to specification. Tighten if necessary.

(f) Verify all mechanical connections are tight and torqued to specification. Tighten if necessary.

(g) Verify compliance of all diagnostic testing.

(h) Verify all operational settings.

(i) Upgrade software as required.

(j) Inspect and clean as necessary all logic card connections.

(k) Check and record all power supply voltages.

(l) Place the UPS back on-line and assure proper operation.

(2) UPS – Lithium-Ion Batteries

2.2.1 ESS is designed to be free of Maintenance when the recommended operating parameters are followed.

2.2.2 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the battery room is secure, and temperatures are within normal operating range.

(3) Generators-

2.3.1 Two (2) Major PMs per year.

2.3.2 One (1) annual and one semi-annual (1).

2.3.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms, leaks or unusual operating conditions are present.

(2) Ensure that the generator enclosure is secure and fuel levels are within range.

2.3.4 Monthly Inspection

(1) Monthly Generator Runs

(1) Run Gens Unloaded for 30 minutes

(2) Conduct a visual inspection of the equipment – ensure no alarms, leaks or unusual operating conditions are present.

(3) Ensure that the generator enclosure is secure and fuel levels are within range.

2.3.5 Semi-Annual PM

(1) Service batteries – add fluid and record specific gravity of each cell (unless maintenance free).

(2) Check battery cable – clean and tighten as necessary.

(3) Check and record battery voltage.

(4) Verify proper battery charger operation.

(5) Service radiators – check for proper fluid levels – add coolant as necessary.

(6) Check and record anti-freeze protection level.

(7) Inspect radiator – ensure fins are clean of dirt and debris and not bent or damaged.

(8) Check engine oil level and add as necessary.

(9) Check oil filters.

(10) Check and record fuel levels.

(11) Check fuel sediment bowl – clean if necessary.

(12) Check for fluid leaks.

(13) Inspect air intake and air filter – clean as necessary.

(14) Check all hoses for pliability and tight connection.

(15) Inspect fan, belts and pulleys for wear. Adjust as necessary.

(16) Inspect governor and adjust as necessary.

(17) Inspect starter motor(s) for signs of damage or wear. Clean and tighten cables, as necessary.

(18) Verify proper operation of engine block heater.

(19) Check electrical components for proper for proper connection and tightness.

(20) Perform general cleaning of generator.

(21) Test run generator and verify output voltages, output frequency, oil pressure and engine temperatures are within specification.

(22) Check instrument and governor operation.

(23) Verify proper operation of remote enunciator panel.

2.3.6 Annual PM

(1) Change the engine oil and oil filters.

(2) Change the fuel filters.

(3) Check calibration and settings on the battery charger.

(4) Draw a fuel sample for laboratory analysis and provide results.

(5) Draw an oil sample for laboratory analysis and provide results.

(6) Draw a coolant sample for laboratory analysis and provide results.

(7) Tests run the generators and conduct a safety shut down test.

(8) Load bank testing the generator for two hours.

- Annual Load Banked – Step loading (25% - 30 min, 50% - 30 min, 75% - 30 min and 100% - 2 hours)

(4) Fuel Cleaning

2.4.1 Annual PM

(1) Upon fuel analysis report, the grading

(2) Draw fuel from the bottom of the tank and pass-through water separators and filter down to 5 microns.

(3) The rejuvenated fuel will be returned to the bottom of the tank under pressure.

(4) The process will be repeated until test show that the fuel and the tank are free of containments.

(5) Automatic Transfer Switches – ASCO 600A Series 7000

2.5.1 Four (4) PMs per year.

2.5.2 One (1) annual and three (3) quarterly.

2.5.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the electric room is secure, and temperatures are within normal operating range.

2.5.4 Quarterly PM

(1) Note and correct any unsafe conditions.

(2) Inspect the appearance and cleanliness of the ATS and enclosure.

(3) Visually Inspect all wiring and connections for signs of tracking, overheating and insulation deterioration.

(4) Verify all grounding connections for proper connectivity.

(5) Verify all lug and mounting insulator bolt connections.

(6) Verify and record all time delay settings.

(7) Verify that all lamps and indicators operate properly.

(8) Clean the exterior and vacuum the interior.

(9) Check all doors and closure mechanisms for proper operation.

(10) Visually inspect the ATS to verify all electrical and mechanical connections are tight.

2.5.5 Annual PM

(1) All steps performed in the semi-annual service plus.

(a) Isolate/de-energize the ATS to tighten all internal components as required.

(b) Verify and clean all internal contacts and devices as required.

(c) Test ATS to ensure it sends a start signal to the generators.

(d) Test ATS to ensure load transfer.

(6) Switchgear – Square D Custom QED Switchboards - MSB-A / MSB-B

2.6.1 One (1) annual PM per year.

2.6.2 One (1) tri annual PM.

2.6.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the electric room is secure, and temperatures are within normal operating range.

2.6.4 Annual PM

(1) Record nameplate data, substation identification and number of cubicles and breakers.

(2) Inspect anchorage, alignment, grounding and clearances.

(3) Inspect physical and mechanical condition. Note any excessive wear, damage or deterioration of components.

(4) Inspect mechanical and electrical indicating devices for proper operation.

(5) Note the condition of the racking mechanisms, the primary disconnects and the primary insulation system.

(6) Check the entire switchgear system to ensure no alarms are present.

(7) Check and record the latest certification date of all required circuit breakers.

(8) Vacuum the interior of the switchgear (de-energized).

(9) Perform primary injection testing of any required circuit breakers.

(10) Test the ground fault interruption system for proper operation.

(11) Lubricate all mechanisms within the switch gear.

(12) Perform a resistance test of the main bus to verify safe operation prior to re-energizing.

(7) Infrared Scanning

2.7.1 Annual PM

(1) Infrared scanning will be performed on energized equipment rated at 100 amps or greater (that is part of the mission critical power path) under load. This includes switchgear, distribution panels, motor starters, control centers, fused safety switches, contactors, transformers, bus ducts and automatic transfer switches.

(2) A report will be furnished at the conclusion of the scanning services. The report shall include all equipment scanned along with the equipment type, manufacturer, designation, location, voltage, amperage, discrepancies (if any) and recommendations for repairs or corrective actions.

2.7.2 Tri Annual PM

(1) All steps performed in the semi-annual service plus.

(a) Verify fuse and circuit breaker sizes and settings correspond to the drawings and coordination study as well as the circuit breakers correct communication with the microprocessor controls.

(b) Verify that the current and transformer ratios correspond to the drawings.

(c) Torque electrical connections to specifications using a calibrated torque wrench.

(d) Confirm correct operation and sequencing of the electrical and mechanical interlock system.

(e) Verify and lubricate as necessary any moving current carrying parts or components.

(f) Verify correct barrier and shutter installation and operation.

(g) Verify filters are in place and air vents are clear and unobstructed.

(h) Inspect control power transformers for physical damage, cracked insulation, broken leads, connection tightness, defects and overall condition.

(i) Perform insulation-resistance tests on control wiring/transformers with respect to ground for one minute.

(j) Verify control power transformer primary and secondary winding integrity and verify correct voltage.

(k) Verify correct function of draw out disconnecting and grounding contacts and interlocks.

(l) Perform insulation-resistance tests on each bus section, phase to phase and phase to ground for one minute.

(m) Perform a dielectric withstand voltage test on each bus section, each phase to ground with phases not under test ground in accordance with manufacturers data for one minute.

(n) Verify accuracy of all meters and calibrate all watt meters.

(o) Test the ground fault interruption system for proper operation at existing settings.

(p) Perform primary injection testing of all breakers.

(q) Perform system function tests.

(r) Perform phasing checks on dual sourced switch gear to ensure correct bus phasing from each source.

(8) Power Distribution Units – APC PMM 500 kVA 480v input / 208v output

2.8.1 One (1) annual PM.

2.8.2 Daily Inspection.

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

2.8.3 Annual PM

(1) Check system for proper operation.

(2) Visually inspect components for integrity, neatness and any damage.

(3) Visually inspect all conductors for deterioration and abrasions.

(4) Verify all fuses are correct type and rating.

(5) Visually inspect all insulators for and insulation material for damage or cracking.

(6) Verify that all panels and access plates are in place and all fasteners are tight.

(7) Check and record input and output voltages.

(8) Check and record input and output amperages.

(9) Verify system monitoring functions are operating properly.

(10) Verify correct labeling for any new circuits.

3. Substation:

3.1.1 25 Inspections a year.

(1) 24 BI-Monthly PM Checks

(2) One (1) Annual PM or Tri-Annual Inspection

3.1.2 Bi-Monthly Checks

(1) Inspect Substation and ensure proper operation.

(2) Inspect any signals or alarms such as controls or breakers.

(3) Inspect all areas for trash or debris.

(4) Verify proper operation of the entire system.

4. Year 1 & 2

Substation

- IR Scanning

(1) Infrared scanning will be performed on energized equipment (that is part of the mission critical power path) under load. This includes switchgear, distribution panels, motor starters, control centers, fused safety switches, contactors, transformers, bus ducts and automatic transfer switches.

(2) A report will be furnished at the conclusion of the scanning services. The report shall include all equipment scanned along with the equipment type, manufacturer, designation, location, voltage, amperage, discrepancies (if any) and recommendations for repairs or corrective actions.

- Oil Sampling

(1) Oil samples will be drawn, (1) time per year and reports will be submitted.

(2) A report will be furnished at the conclusion of the services. The report shall include all equipment sampled along with the equipment type, manufacturer, designation, location, voltage, amperage, discrepancies (if any) and recommendations for corrective actions.

5. Year 3

Substation

(1) All steps performed in the annual service plus Tri-Annual.

- Current Transformer
- 69kVac Motor Operated Disconnect Switches
- 34.5kVac Motor Operated Disconnect Switches
- 66kVac Surge Arresters
- 30kVac Surge Arresters
- SEL 787 Relays
- SEL 751 Relays
- Station Service Transformers
- Fall of Potential Ground Resistance Test
- Point-to-Point Ground Resistance Tests
- Multi-Function Meters
- End to end testing from remote site to American Power

Switchboard SWGR-1

- 3000 Amp Vacuum Circuit Breakers
- 1200 Amp Vacuum Circuit Breakers
- 30kVac Surge Arresters
- Voltage Transformers
- SEL 751 Relays
- SEL 587Z Relays
- Current Transformers
- Set of Medium-Voltage Conductors
- Point-to-Point Ground Resistance Test
- Multi-Function Meters

Switchboard SWGR-2

- 3000 Amp Vacuum Circuit Breakers
- 1200 Amp Vacuum Circuit Breakers
- 30kVac Surge Arresters

- Voltage Transformers
- SEL 751 Relays
- SEL 587Z Relays
- Eighty-Seven (87) Current Transformers
- Sets of Medium-Voltage Conductors
- Point-to-Point Ground Resistance Test
- Multi-Function Meters

Battery System

- Two (2) Battery Chargers
- Two (2) 125VDC Battery System

Relay current and voltage checks per engineer's instructions. Control schematic verification per engineer's instructions.

*Note – End to End testing assumes testing plan and coordination with utility to be done by others.

6. Mechanical Support Activities

(1) HVAC Systems – Main Data Center Air Handler Units

6.1.1 Four (4) PMs per year.

6.1.2 One (1) annual and three (3) quarterly.

6.1.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the equipment is secure, and temperatures are within normal operating range.

6.1.4 Quarterly PM

(1) Verify AHU is operating properly.

(2) Record number of starts for compressor.

(3) Record operating hours for compressors.

(4) Check units for unusual vibration or noise.

(5) Check all motors, fans and belts for wear, proper adjustment and operation.

(6) Check for refrigerant leaks.

(7) Check for proper refrigerant level – add, as necessary.

(8) Check compressor oil level – add, as necessary.

(9) Check and calibrate unit safety and operating controls.

(10) Check temperature controls.

(11) Check and tighten all electrical terminals.

(12) Check crankcase heaters.

(13) Check and adjust as necessary all operating controls.

(14) Check and record all operating data including operating voltages and amperages and operating temperatures and pressures.

6.1.5 Annual PM

(1) All steps performed in the semi-annual service plus.

(a) Clean the control panel.

(b) Pressure wash condenser coils as necessary.

(c) Clean the cabinet and over all unit.

(d) Perform insulation resistance checks on the compressors.

(e) Replace oil filters.

(f) Draw oil sample for analysis and provide results.

(2) HVAC Systems - Auxiliary Systems Roof Top Units

6.2.1 Four (4) PMs per year.

6.2.2 One (1) annual and three (3) quarterly.

6.2.3 Daily Inspection

(1) Conduct a visual inspection of the equipment – ensure no alarms or unusual operating conditions are present.

(2) Ensure that the equipment is secure, and temperatures are within normal operating range.

6.2.4 Quarterly PM

(1) Check systems for proper operation.

(2) Inspect oil levels. Add oil if necessary.

(3) Check electrical connections (tighten as necessary), contacts and fuses.

(4) Check mechanical general conditions.

(5) Change filters as required.

(6) Check for visible leaks and unusual noises or vibrations.

(7) Check for refrigerant leaks.

(8) Check for proper refrigerant level – add as necessary.

6.2.5 Annual PM

(1) All steps performed in the semi-annual service plus.

(a) Clean the control panel.

(b) Pressure wash condenser coils as necessary.

(c) Clean the cabinet and over all unit.

(d) Perform insulation resistance checks on the compressors.

(e) Replace oil filters.

(f) Draw oil sample for analysis and provide results.

7. Fire/Life Safety Support Activities

(1) Twelve (12) monthly PMs (As Described Below).

(2) One (1) annual, one (1) semi-Annual, and two (2) quarterly.

(3) Daily Inspection

7.3.1 Conduct a visual inspection of the fire panel(s) and pre-action / sprinkler control rooms – ensure no alarms or unusual operating conditions are present.

7.3.2 Ensure that the sprinkler room(s) is secure, and temperatures are within normal operating range.

7.3.3 Visually inspect the portable fire extinguishers and verify proper charge.

(4) Portable Fire Extinguishers

7.4.1 Monthly PM

(1) Verify mounting hardware is sufficient to adequately support the portable extinguisher.

(2) Verify that there are an adequate number of extinguishers available in the space protected.

(3) Visually inspect the fire extinguished and verify proper charge.

(4) Ensure obsolete extinguishers are not being used.

(5) Water Based Systems (Pre-Action and Wet)

7.5.1 Quarterly PM

(1) Inspect all alarm devices to ensure that they are free of physical damage. Includes water flow devices, valve supervisory devices and supervisory signal devices.

(2) Inspect fire department connections.

(3) Inspect hydraulic name plate to verify that it is securely attached to the sprinkler riser and is legible.

(4) Inspect gauges for good condition and proper water pressure.

(5) Test priming water level in supervised pre-action systems for compliance with manufacturer's specifications.

(6) Test mechanical water flow devices.

(7) Test low pressure alarms.

(8) Test for proper operation and enunciation.

(9) Return system to normal operating condition after servicing.

7.5.2 Semi-Annual PM

(1) All steps performed in the quarterly service plus.

(a) Test valve supervisory switches and supervisory signal devices and verify:

(i) A distinctive signal shall indicate movement from the valves normal position either during the first two revolutions of the hand wheel or when the stem of the valve has moved one-fifth from its normal position.

(ii) The signal shall not be restored at any valve position except the normal position.

7.5.3 Annual PM

(1) All steps performed in the semi-annual service plus.

(a) Inspect pipe and fittings to ensure that they are in good condition and free of damage, leaks or corrosion.

(b) Inspect hangers and brackets as required by the authority having jurisdiction.

(c) Inspect sprinklers for signs of leakage and ensure they are free of corrosion, foreign materials, paint and physical damage.

(d) Inspect sprinkler system for the proper number of sprinklers and the availability of a sprinkler wrench for each type of sprinkler.

(e) Trip each control valve through its entire operating range and return to its normal position.

(f) Test main drain annually or any time the control valve is closed and reopened at system riser.

(g) Inspect pre action compressor for leaks, unusual noises and proper operation.

(6) Fire Detection and Suppression Systems

7.6.1 One (1) Annual.

7.6.2 Two (2) Quarterly PMs.

7.6.3 Quarterly

(1) Verify the operation of the alarm device tamper, flow and pressure switches

7.6.4 Annually

(1) Operate the control valves fully closed and open; provide lubrication.

(2) Open the pre-action valve, clean the interior of the valve assembly; replace or repair parts as necessary.

(7) Fire Detection and Alarm

7.7.1 Quarterly Inspection

(1) Inspect radiant fire detectors and ensure proper operation.

(2) Inspect supervisory signal devices such as control valve switches, high or low air pressure switches, water temperature switch and water level switch.

(3) Inspect all water flow devices.

(4) Verify proper operation of the entire system.

8. Data Center Floor Management

(1) Data Center Monitoring and Cleaning

8.1.1 One (1) Annual.

8.1.2 Three (3) quarterly PMs.

8.1.3 Daily Inspection

(1) Conduct a visual inspection of all facility areas – ensure no alarms or unusual operating conditions are present.

(2) Ensure that all rooms are secure, and temperatures are within normal operating range.

8.1.4 Quarterly Cleaning

(1) Floor surface – Remove loose dirt and contamination by vacuuming the entire floor surface including between and underneath hardware (as accessible) using HEPA filtered vacuum cleaners.

(2) Power scrub entire floor surface with synthetic scrub pads designed to recondition the finish of high-pressure laminate flooring.

(3) Strip mop with nonionic chemicals designed to neutralize static on the raised or tile floor.

(4) Clean the computer room equipment as accessible using lint free cloths.

8.1.5 Annual Cleaning

(1) Clean under the sub floor by removing only the tiles that are easily removed. Fixed tiles will be cleaned via removal of adjacent tiles.

(2) Clean the entire sub floor support structure to include hardware cables, underside of floor tiles, pedestals, stringer system drains, and mechanical and electrical piping and the actual floor surface using HEPA filter vacuum cleaners.

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Claude Raymond Van Steenwinkel

SerialNumber = TINIT-VNSCDR59E20Z103X

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Table 1. Document Owner and Approval

Document owner	Andy Salcido	Approvers	Sudhir
Date approved	1-20-2021	Date published	1-20-2021
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Table 2 Document Change Log

Date	Version	Edited sections	Edited by	Reason
19 June 2020	0.1	Document Creation	Andy Salcido, John Shine	Document Creation
1-19-2021	0.2	Document Update, Substation PM addition	Andy Salcido	Document Update